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Original Research Article

Human activities and biodiversity conservation: Osun Osogbo World Heritage Site, Nigeria

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Abstract

The study was undertaken at the Osun Osogbo World Heritage Site in the Southwestern region of Nigeria. The Sacred site, located approximately between latitudes N7^0.45020^1 and E4^0. 3307^1 in the south western corner of the country, is an important habitat for wildlife of both local and global conservation significance. This study investigated the effects of human activities (e.g. farming, hunting, fuelwood harvesting, etc.) on the environment and biodiversity conservation in the area, as well as the implications of such activities for the future of the Osun Osogbo Festival of the local Osogbo people. The festival is an important ecotourism attraction, which is of economic and socio-cultural significance for the local people and the country at large. The methodology involved interviews with a cross-section of the local people, and focus group discussions (FGD). The results indicated that, among the various human activities undertaken in the area, fuel wood harvesting, bushfire setting, hunting, and farming had the greatest impact on biodiversity conservation through degradation of the ecosystem over the years. Furthermore, about 85% of the respondents regarded the "Osun Osogbo" Festival as a major socio economic activity in the area. There, however, appeared to be little awareness of both "western" and traditional methods of wildlife conservation. Suggestions for the improvement of the ecosystem and its sustainable management are: (i) biodiversity conservation club initiatives, (ii) enhancement of conservation education and awareness (iii) public enlightenment on traditional and modern knowledge system of biodiversity conservation, (iv) initiating incentive packages for implementing agencies and (vi) encouraging community participation initiatives in conservation management strategies.

Keywords: Conservation management, Osun Osogbo festival, Sacred grove, World heritage site and protected Area

INTRODUCTION

The basic human life-support systems of the biological environment have always been characterized by change, an inevitable consequence of all human land use throughout history (Mather, 1986; IGBP/HDP, 1993). Seemingly, humans at some point have altered "natural" or pristine ecosystems have been altered significantly by humans at some point in the past (Turner *et al.,* 1990). The generally low human populations, practice of sustainable traditional agriculture, fishing, and animal husbandry, as well as limitation of land use to a relatively smaller segment of the population using simple tools on smaller land areas, however, ensured the sustenance of soil fertility without the use of agro-chemicals. Biodiversity conservation was, thus, achieved through environmentally friendly traditional human cultural practices and beliefs (Boaten, 1998; Amlalo *et al.,* 1998). This in turn fostered a close and mutually supportive relationship between humans and biodiversity for tens of thousands of years (McNeely *et al.,* 1995).

In recent times, biodiversity has become easy targets

for human over-exploitation due to burgeoning human populations and the quest for a "better life" through improvements in science and technology. Biodiversity, therefore, is being exploited at much faster rates than ever before with negative implications for sustainable human livelihood (Turner *et al.,* 1990). Wilson (1992) has stated that biodiversity is facing a decline of crisis proportions, which could ultimately lead to mass extinctions in the very near future. In Nigeria, illegal human activities in wildlife conservation area must urgently eliminate; to protect the wild animals and plants from over exploitation (Ayeni, 1985).

Ecosystem stands for ecological system and is essentially somewhat more of technical term for "nature" Odum, (1963); and therefore is to a very considerable extent a self- regulating entity capable of achieving a degree of homeostasis or equilibrium (Kormondy, 1976) and therefore subjected to degradation through grazing, fishing, farming poaching and excavation for various agricultural and industrial uses. In recent times, however, the attraction and value of ecological environment has important wildlife habitats, among other uses. Provision of fin and shell fish, salt, thatch, wood, etc. (Sather and Smith, 1984; Ryan and Ntiamoa-Baidu, 2000) have been increasingly recognised. Natural ecosystems are especially important as nutrient-rich habitats for protection and promotion of ecological processes and life support systems such as nutrient cycles, hydrological cycles, soil regeneration, cleansing and purifying activity (Wahab, 2014).

The Osun Osogbo World Heritage Site in the South Western region of Nigeria is one of two internationally-recognised ecological environments (Sacred sites) under the Convention on preservation of cultural and natural sites (UNESCO Convention); because of its importance as a cultural and natural enrichmement. The cultural/natural site is particularly important to the local Osogbo people, serving as their traditional sacrifice grounds, especially during their annual "Osun Osogbo" Festival.

Current evidence indicates that the degradation of the ecological site could be largely attributable to neglect and unsustainable human activities (e.g. bushfire setting, grazing, hunting, farming, fuel wood harvesting, estate development, etc); a reasonable number of protected areas indicated encroachment and illegal occupation over the years (Kotharri, 1989). The main objectives of this study were (i) to investigate the impact of various human activities (farming, hunting, grazing, fuel wood gathering, and bushfire setting) on biodiversity conservation (abundance and diversity of flora and fauna) in the ecosystem, and (ii) to obtain useful data/information to enable recommendations to be made regarding the better management of the ecosystem. Ultimately, it is hoped to sustain the annual Osun Osogbo Festival through the improvement of its ecotourism potential and, consequently, the economic well-being of the local people.

MATERIALS AND METHODS

Study area

The study was conducted in the Osun Osogbo World Heritage Site (OOWHS) located in Osogbo local government council in the state of Osun, Nigeria on the latitude 7^0 45 – 9^0 30 N and longitude 4^0 33 – 6^0 25 E encompasses over 75 ha in the core zone and 47 ha in the buffer zone. The study site is 285 the sea level and primarily deciduous forest but due to human activities, the former luxuriant vegetation has been changed. The study site has an average population of 108,092 as gazette in 1993 (Osun state gazette).

Data were collected by administering one hundred (100) questionnaires to respondents at four (4) divisional zone of the site. In each division systematic random sampling method of data collection was adopted. This involves spot data collection from the willing respondents with twenty-five (25) questionnaires allocated to each division. The vegetation of the ecosystem in OOWHS of rain forest comprises mainly of grassland, thicket Island and savanna trees (Wahab 2014).

Dominant grass species includes *Andropogon gayanus*, *Axonopus compresus* and Burmania *hirtelus*. About (40%) of the area was converted into *Colocasia exculentums*, *Brachystegia* eurycoma, *Azadiracta indica*, *Antiaris toxicaria*, *Baphia nitida* and *Funtumia elastic*, when parts of the area were designated as forest reserve (first and second palace areas). The major human activities at the buffer zone of the ecosystem are farming and hook and line fishing at the sacred river. Other activities include hunting, grazing, fuelwood harvesting and teaching.

Administration of questionnaires

Questionnaires were administered in those selected areas. Prior to the administration of questionnaire, the surrounding communities (buffer zone) in the four (4) divisional areas were visited for a formal introduction and interaction with the heads of the communities (district head/baale) who served as linked persons. During the visit a rough estimated number of household in each selected communities was made to determine the number of questionnaire to be administered in each of the division. A total number of hundred (100) was randomly distributed, (twenty five (25) in each division) selected so as to allow equal opportunity for every person being chosen to react independently. The tools used in the analysis were descriptive statistics such as means, frequencies and percentage.

Table 1. Demographic characteristics of the respondents in the surrounding buffer zone of the site

Variables	Categories	Frequency	Percentage (%)
AGE	21-30	38	38
	31-40	25	25
	41-50	20	20
	ABOVE 50	17	17
GENDER	Male	83	83
	Female	17	17
EDUCATIONAL STATUS	Tertiary education	20	20
	Secondary	47	47
	Primary	22	22
	No formal	11	11
OCCUPATION	Civil servant	10	10
	Herbalist	11	11
	Teaching	10	10
	Hunting	15	15
	Fishing	10	10
	Farming	17	17
	Fuel Woodhavesting	15	15
	Grazing/ Livestock	12	12
MARITAL STATUS	Married	73	73
	Single	27	27
RELIGION	Christianity	37	37
	Islamic	43	43
	African Traditionalist	20	20

The respondents were of various age groups, religious denominations, occupations and educational background with their tribes. Most of the questionnaires were individually administered and the questionnaires explained to the respondents with the help of a colored illustration of the animals. The respondents were allowed ample time to complete the questionnaires. The questions in the questionnaires were translated to local languages of the people found in the survey area (Hausa/Fulani, Igbo, Yoruba) by the interviewers and further notes were taken alongside the structured questions.

RESULTS

The respondents, (83%) of which were males covered the wide range of age groups with youngest being 24 years old and the oldest claimed to be 90 years old (unconfirmed). The dominant age group (38%) was 21 - 30 years old, while only (17%) were above 50 years of age. About (11%) of the respondents lacked formal education, but as many as (69%) had primary and secondary (JSS and SSS) education. Only (20%) of the respondents had received tertiary education. Crop farming was the dominant occupation (17%) around the buffer zone of the site, but about (83%) of the respondents claimed to have been involved in one or more secondary occupations. Majority of the respondents (73%) were married while single are equally represented. In addition, the respondents (43%) were Islamic, while Christians and African traditionalist were equally represented (Table 1).

During the study, (15%) of the respondents were found to be hunters. Majority of the hunter's respondents were inhabitants of the largest community in the study area (Oke osun and Isale osun). It was observed that (75%) of the respondents were hunters taken it as secondary occupation and (25%) were taken it as a primary occupation. Majority of the respondents use short guns (45%) as their hunting tools while locally manufactured guns and traps were equally represented. The respondents were found mostly hunted for Grass cutter (27%) while others were equally represented. Also, most respondents used individual hunting (60%) as their mode of hunting method while group hunting was equally represented. (Table 2)

Fuelwood collection

The main source of energy for the people was fuel wood which was used by (83.5%) of respondents.

Other energy sources were charcoal, kerosene and electricity. Fuel wood is the energy source of choice because of its availability, relatively cheap and easiness of use. There were slight more than (55.4%) female fuel wood users than male. Only about (3%) were professional fuel wood collectors. (75%) of fuelwood users harvested it from the wild, (14.7%) bought from the

Table 2. Hunting and Conservation

Variables	Categories	Frequency	Percentage (%)
Hunting as an activities	Secondary	75	75
	Primary	25	25
Tools	Short guns	45	45
	Locally manufactured guns	30	30
	Traps	25	25
Hunted animals	Duiker	26	26
	Grass cutter	27	27
	Bushbuck	14	14
	Giant rats	9	9
	Others	24	24
Hunting strategies	Individual hunting	60	60
	Group hunting	40	40

Table 3. Fuel wood Collection and Biodiversity

Variables	Categories	Frequency	Percentage (%)
Use of fuel wood as energy	Yes	83.5	83.5
	No	16.5	16.5
Gender and fuel wood use	Male	44.6	44.6
	Female	55.4	55.4
Fuel wood Harvesting as an occupation	Secondary	97	97
	Primary	3	3
Source of Fuel wood	Harvesting from wild	75	75
	Buying from market	14.7	14.7
	Collecting from farm	5	5
	Others	5.3	5.3
Frequency of Fuel wood collection	Once/twice a week	73	73
	More than twice a week	27	27
Types of Fuel wood	Bamboo	74.3	74.3
	Others	25.7	25.7

market while (5%) collects from their farms after burning. Above two thirds (73%) do collect fuelwood once or twice a week while (27%) collects more than twice a week. It was observed that about two thirds types of fuelwood collected were (74.3%) of bamboo while others is equally represented. (Table 3)

Farming

Farming was observed around the buffer zone of the site on both subsistence (74.3%) and commercial (25.7%) bases. Land cultivation was normally prepared manually (90%) either by individual farmer (85.6) or by group farming (14.4%). There was little mechanized farming at the boundary zone of the site (10%). Above two thirds of the farmers (77%) thought that their activities had no effect on the wildlife of the area. (Table 4)

The Osun Osogbo festival and conservation

Osogbo Township belongs to the celebration of the annual Osun Osogbo festival (70%). Majority of such respondents (73%) were more than 30 years of age. Membership of the Osogbo Township afforded the individual an opportunity to defend their community, engage in community development activities and to fraternize with other members. Two major reasons observed for recent difficulty in getting animal catching were angel of gods (66%) and environmental degradation (25%), while the other reason is the experience of osogbo group and their rampant encroachment of the site. Majority of the respondents (98%), that experienced annual Osun Osogbo festival thought of the important ecotourism attraction which also provides opportunity for family reunions while others thought that it only enables conservation of the mermaid, flora and fauna and afforded an opportunity to thank the gods over the year.

Table 4. Farming and Biodiversity

Variables	Categories	Frequency	Percentage (%)
Types of farming	Subsistence	74.3	74.3
	Commercial	25.7	25.7
Land preparation for cultivation	Manual	90	90
	Mechanized	10	10
Types of mechanized farming	Individual	85.6	85.6
	Group	14.4	14.4
Size of farms	Small (1-5 ha)	87	87
	Large (> 5 ha)	13	13
Effect of farming on wildlife	Yes	23	23
	No	77	77

Table 5. The Osun Osogbo Festival and Biodiversity

Variables	Categories	Frequency	Percentage (%)
Membership of Osogbo	Yes	70	70
	No	30	30
Age and Osogbo group member	More than 30	73	73
	Less than	27	27
Reasons for difficulty in getting animal catches in recent times	Angel of gods	66	66
	Environmental degradation	25	25
	Experience of Osogbo group	9	9
Importance of Osun Osogbo for ecotourism	Yes	98	98
	No	2	2
Awareness of traditional conservation (taboo days, sacred grove)	Yes	87	87
	No	13	13
Traditional versus Western conservation	Effect of traditional conservation	2.7	2.7
	Effect of western conservation	97.3	97.3

Above two thirds (87%) were aware of traditional methods of biodiversity conservation e.g. introduction of taboo days, establishment of sacred groups, shrines etc which were passed on from one generation to another generation (oral tradition) through parents, clients and community leaders, While the rest were equally represented. Only (2.7%) respondents thought that traditional biodiversity was more effective than orthodox “western” methods (legislation, bye-laws and community laws). Major reasons assigned for the apparent effectiveness of traditional conservation were the influence of western religious practices and respect of younger generations for traditional authority. (Table 5)

Bush fire

During the study period, it observed that human activities were carried mostly at the buffer zone site while there was encroachment to the core zone of the sacred grove. Vegetation burning in the study area in this boundary was observed from late November to early February. Almost all the bush fire recorded (85%) were human caused (anthropogenic), out of which (65.3%) were deliberately set. Deliberate bush fires were either set by hunters (30%) or grazers (20%) and (50%) clearing vegetation on land for cultivation. Dropping of cigarette butts (70%) was the main cause of accidental bush fire followed by on-farm cooking. Mostly (95%) of such fire setters attempt

Table 6. Bush fire and Conservation

Variables	Categories	Frequency	Percentage (%)
Source of bushfire	Anthropogenic	85	85
	Natural	15	15
Sources of Anthropogenic bushfire	Deliberate	65.3	63.5
	Accidental	34.7	34.7
Sources of deliberate bushfire	Hunting	30	30
	Vegetation clearing for vegetation	50	50
	Grazing	20	20
Sources of accidental bushfire	Dropping of cigarette butts	70	70
	On-farm cooking	30	30
Attempt to control bushfire	Yes	95.6	95.6
	No	4.4	4.4
Benefits of bushfire	Yes	20	20
	No	80	80

some form of fire control while the rest thought it's unsafe to do so. Above two thirds of the respondents, thought bush fire should be discouraged because of their detrimental effect on the environments. (Table 6)

DISCUSSION

Hunting

In this part of the country as in other parts of Africa, wild animals are considered destructive and are only good for their meat, and are therefore hunted for protection or as a source of protein for the human population (Asibey, 1965a). Bushmeat is a popular delicacy in both rural and urban areas of Ghana (Falconer, 1992), as well as a valuable source of protein, especially for rural communities (Asibey, 1986; Ntiamoa-Baidu, 1987). As a result, of bush meat prices that tends to be higher than that of traditional sources of protein (goat, sheep, ram and cattle etc), commercial bush meat hunting as been a major economic activity of this part of the country leading to an influx of migrant hunter from nearby settlement to hunt the already over exploited bush meat animals. Fewer members of hunters in the area could be because of sacred nature of the site, made the area protected for biodiversity conservation. The traditional taboos and sacred laws binding the site had proved conservation effort effective in this area of the country with the collaboration efforts of the traditional councils. The acceptance of the sacred grove and its enlistment in 2005 as a world heritage site supported by effective management of the study area enhances the it ecotourism potential.

Fuel wood collection

Fuel wood provides the main energy source for both rural and urban households throughout the entire West African sub-region, with estimates of about 50% of total energy consumption (Korem 1985). Fuel wood plays an important role in human activities like fish smoking and charcoal production in the essentially rain forest community. It was apparent from this study that over-exploitation of fuel wood has resulted in a reduction in size of fuel wood harvested, and the use of less-preferred materials like bamboo trees, twigs, cassava sticks, and tree stumps. Some of the reasons for fuel wood over-exploitation in the area include:

(a) High costs of alternative energy sources (e.g. liquefied petroleum gas, electricity, etc.).
(b) Alternative uses of fuel wood for non-domestic purposes like preparation of "street food" fish smoking and pottery.
(c) Provision of commercial quantities of charcoal that is of high demand in urban areas; of lighter weight, slow and hot burning qualities.

The higher percentage of female fuel wood collectors and users in the study area appeared in keeping with the traditional role of women as "meal preparers" in most rural and urban African communities.

Farming

The large proportion of respondents who did not consider farming activities as threats to biodiversity and environment, as well as a lack of awareness of the direct (source of meat, medicine, etc.) and indirect (pollinators, seed dispersers, etc.) uses of biodiversity to human populations, suggested a rather low priority given to

wildlife or environmental awareness among the wetland community. It appeared that farming was undertaken without due consideration to sustainable land use practices, with large tracts of land being cleared for farming and infrastructural development at the expense of valuable wildlife habitat. The important roles of wildlife in the ecosystem food web as pollinators, predators, seed dispersers or prey species of other animals did not seem to have been appreciated by a majority of the local people. An appreciation of such indirect values of wildlife is important to prevent destruction of wildlife habitat through farming and other human activities.

The "Osun Osogbo" festival and conservation

It is not amazing that about (66%) of the pre-dominantly rural and superstitious communities in the study area attributed the difficulty of getting catches of the festival animal was due to the anger of the gods, rather than the fact that any renewable resource harvested faster than its regeneration rate, was bound to become depleted sooner or later. This was experienced because of sacredness of the study area.

It is quite remarkable that in a community where most individuals were born into a family belonging to traditional belief community (Osogbo); about 70% of the respondents were from Osogbo members. This situation has serious negative implications for the future of the economically important "Osun Osogbo" Festival. In addition, the enlistment of the site in the year 2005 as a world heritage site has contributed immensely to the acceptance of the ecotourism (culture) attraction of the site worldwide.

Historically, African societies have had a stable co-existence with wildlife, because of the intrinsic value attached to environ-mental conservation in African cultural practices (Hadley, 1985). This supported the traditional beliefs of Osun Osogbo festival for its preservation biodiversity conservation.

Bush fire

Bush fires are natural phenomenon beneficial to biotic and a biotic component of ecosystems (Afolayan, 1978a). However, indiscriminate and repeated anthropogenic bush fires impact negatively on such ecosystem. Therefore, needs to be checked. Nonetheless, high effect of such was not at the core zone of the site. Unfortunately, bush fire setters do not often taken into consideration the direct (killing through burning) and indirect (cleaning vegetation and exposing vulnerable animals to predation) destructive effects on wildlife (Collins, 1960). They rather considered anthropogenic bush fire as beneficial in many ways:

(a) Driving in away dangerous animals like snake, which shelters in dense vegetation
(b) Enhance efficiency in shortening grasses and attracting game animals after burning.
(c) Destruction of implantable grass (e.g. *H. contortus* and *Bothriichloa* species), and stimulating the sprouting of new and more palatable grass for grazing mammals at the beginning of the wet season (Korem, 1985; Happold, 1995).

CONCLUSION

From the results of the study, the major human activities that impact on the biodiversity of the study area were, hunting, farming, fuelwood harvesting and bushfires, in order of importance. Hunting pressure has increased over the years, against the back-ground of waning resilience of traditional conservation practices in the study area. In sustaining the economically important of Osun Osogbo Festival as well as biodiversity conservation initiatives in the study area, the following are recommendations need to be taken:

• integration of indigenous knowledge, practices and skills into modern methods of conservation through local participation, in conservation initiatives in order to develop sustainable conservation pro-grammes
• initiation of education and awareness programmes targeted at children and the youth, stressing the direct and indirect values of wildlife and the scientific basis of traditional conservation
• integration of both traditional and modern knowledge systems of biodiversity conservation into school curricula
• integration of afforestation programmes to attract wildlife to the traditional hunting grounds, and protection of such grounds from bushfires and other human activities to enable recovery of bushbuck popula-tions
• encouragement of local inhabitants to harness other forms of biomass energy (e.g. crop residue, organic refuse) in order to reduce pressure on fuelwood
• provision of adequate financial resources for agencies involved in conservation efforts in the wetland to enhance their efficiency and performance

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